

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Original): A device for inspecting the inside of an underground pipe line, which is provided with a radar for inspecting cavities present in at least part of the ground surrounding the underground pipe, the device comprising:

a pipe line internal self-propelled vehicle, which comprises an antenna for said radar and moves inside the pipe line of said underground pipe; and

an on-ground control unit for conducting control of said movement of the pipe line internal self-propelled vehicle and processing signals of said radar, wherein

said pipe line internal self-propelled vehicle comprises an antenna rotation mechanism for rotating said antenna along the inner peripheral surface of said underground pipe and capable of changing the position of said antenna so that said antenna follows said inner peripheral surface.

Claim 2 (Original): The device for inspecting the inside of an underground pipe line according to claim 1, wherein

said pipe line internal self-propelled vehicle comprises a height adjustment mechanism capable of changing the position of said antenna rotation mechanism in the up-down direction inside said pipe line of said underground pipe according to the inner diameter of said underground pipe so

that the rotation center of said antenna coincides with the center of the inner diameter of said underground pipe.

Claim 3 (Original): The device for inspecting the inside of an underground pipe line according to claim 1 or 2, wherein

said pipe line internal self-propelled vehicle comprises antenna position detection means for detecting the position of said antenna, and

in said on-ground control unit, signals of said radar are analyzed and radar images of the ground surrounding said underground pipe in a plurality of directions perpendicular to the traveling direction of said pipe line internal self-propelled vehicle are created as two-dimensional radar images for each said direction and displayed in a real time mode.

Claims 4-5 (Canceled).

Claim 6 (Currently Amended): The device for inspecting the inside of an underground pipe line according to any one of claims 1 ~~[[,]]~~ or 2, ~~4 or 5~~, wherein

said pipe line internal self-propelled vehicle comprises a fisheye lens camera for taking pictures of said inner peripheral surface of said underground pipe line forward in ~~[[said]]~~ a

traveling direction and the expanded image is created and displayed in a real time mode by said on-ground control unit from the images picked up with the fisheye lens camera.

Claim 7 (Currently Amended): The device for inspecting the inside of an underground pipe line according to any one of claims 1 [[,]] or 2, ~~4 or 5~~, wherein

said pipe line internal self-propelled vehicle comprises a gyro for measuring the inclination of said pipe line internal self-propelled vehicle in [[the]] a traveling direction with respect to the horizontal direction and a laser sensor for rotating along said inner peripheral surface of said underground pipe to measure the convergence of said underground pipe over the entire inner peripheral surface, and the signals of said gyro and the signals of said laser sensor are analyzed in said on-ground control unit to create three-dimensional convergence images and display them in a real time mode.

Claim 8 (Previously Presented): The device for inspecting the inside of an underground pipe line according to claim 6, wherein in said on-ground control unit, the correspondence is established between said radar image and said expanded image in the same observation point or, when said convergence image is present, the correspondence is established between said radar image, said expanded image, and said convergence image in the same observation point.

Claim 9 (Currently Amended): The device for inspecting the inside of an underground pipe line according to any one of claims 1 [[,]] or 2, ~~4, or 5~~, wherein said pipe line internal self-propelled vehicle comprises an infrared encoder for measuring the travel distance thereof.

Claim 10 (Original): The device for inspecting the inside of an underground pipe line according to claim 6, wherein said underground pipe is made from concrete, and said pipe line internal self-propelled vehicle comprises spraying means for spraying a concrete deterioration diagnostic reagent, which changes the color of the surface to which it has adhered according to the presence or absence of concrete deterioration, on the inner peripheral surface of said concrete in said underground pipe line when said self-propelled vehicle moves inside the pipe line.

Claim 11 (Original): The device for inspecting the inside of an underground pipe line according to claim 10, wherein a reagent for judging the presence or absence of deterioration caused by sulfuric acid is used as said concrete deterioration diagnostic reagent.

Claim 12 (Previously Presented): The device for inspecting the inside of an underground pipe line according to claim 10, which comprises a sensor for detecting toxic gases such as hydrogen sulfide.

Claim 13 (Previously Presented): The device for inspecting the inside of an underground pipe line according to claim 10, wherein

said pipe line internal self-propelled vehicle comprises a gyro for measuring the inclination of said pipe line internal self-propelled vehicle in the traveling direction with respect to the horizontal direction and a laser sensor for rotating along said inner peripheral surface of said underground pipe to measure the convergence of said underground pipe over the entire inner peripheral surface, and

the signals of said gyro and the signals of said laser sensor are analyzed in said on-ground control unit to create three-dimensional convergence images and display them in a real time mode.

Claim 14 (Previously Presented): The device for inspecting the inside of an underground pipe line according to claim 10, wherein

in said on-ground control unit, the correspondence is established between said radar image and said expanded image in the same observation point or, when said convergence image is present, the correspondence is established between said radar image, said expanded image, and said convergence image in the same observation point.

Claim 15 (Previously Presented): The device for inspecting the inside of an underground pipe line according to claim 10, wherein said pipe line internal self-propelled vehicle comprises an infrared encoder for measuring the travel distance thereof.

Claim 16 (Previously Presented): A method for inspecting the deterioration of concrete inside an underground pipe line by using the device for inspecting the inside of an underground pipe line according to claim 10,

wherein said spraying means sprays a concrete deterioration diagnostic reagent, which changes the color of the surface to which it has adhered according to the presence or absence of concrete deterioration, on the inner peripheral surface of said concrete in said underground pipe line when said self-propelled vehicle moves inside the pipe line,

after said spraying, said fisheye lens camera takes pictures of said inner peripheral surface of said underground pipe line, and

said on-ground control unit creates said expanded image from said picked-up images, judges as to whether the deterioration of the inner peripheral surface of said concrete is present based on the expanded image and displays them in a real time mode.

Claims 17-24 (Canceled).